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09/830,949	07/06/2001	Naohiro Hirose	P 280144	5351

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EXAMINER

CHAMBLISS, ALONZO

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 08/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/830,949

Applicant(s)

HIROSE, NAOHIRO

Examiner

Alonzo Chambliss

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 July 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-89 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-89 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/3/01, 7/6/01, 7/2/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. The pre-amendment filed on 5/3/01 has been fully considered and made of record the application.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 5/3/01, 7/6/01, and 7/2/04 was filed before the mailing date of the non-final rejection on 7/9/06. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. the following title is suggested: " CONDUCTIVE CONNECTING PIN FOR A PACKAGE SUBSTRATE ".

Claim Objections

4. Claims 4 and 81 are objected to because of the following informalities: the first occurrence of " times " in claim 4 and both occurrences in claim 81 are misspelled. Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 5-12, 19-34, 41-52, and 64-84 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. In claims 5-7, 19, 23-25, and 41-43, the phrase " a via hole " is vague and indefinite since it is not clear from the claim where the via hole extends through.

8. In claim 5-7, 19, 23-25, and 41-43 the phrase " a pad for securing the conductive connecting pin is provided for a portion or the overall body of the outermost layer of the build-up " is vague and indefinite since the language is confusing.

9. In claim 64 and 65, the phrase " a recess formed around the opening " is vague and indefinite, since it is not clear from the claim what the recess is formed in.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1-3, 13, 53-56, 62-66, 83, and 85-89 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Moriizumi et al. (JP 10-294396).

With respect to Claims 1, 53, 54, 62-65, 83, and 85-88, Moriizumi teaches a plane layer or metal layer (i.e. any one of layers 24b-24f) made of copper and a pad 24a (i.e. a plane layer of conductor material or conductor circuit) formed on said

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substrate 12 and arranged to secure the conductive connecting pin 16, wherein the pad is coated with an organic resin insulating layer 20a-20e (i.e. any one of the layers or a combination of all the layers). The organic resin insulating layer 20a-20e has an opening that has a recess (i.e. for example in any one of insulating layers 20a, 20b, 20c, or 2d above the insulating layer 2e) which the pad 24f is partially exposed to the outside and the conductive connecting pin 16 is through a conductive adhesive agent (i.e. solder), secured to the pad 24f exposed through the opening. The pin is secured to the pad 24f (i.e. conductor circuit) exposed to the outside through the opening of the organic resin insulating layer by a metal layer (i.e. any one of layers 24b-24f) and conductive adhesive layer 26 (see English translation, paragraphs 6, 7, and 15-22; Figs. 1-4).

With respect to Claim 2, Moriizumi teaches a conductive connecting pin 16 for establishing the electrical connection with another substrate 40 is secured. A pad 24f formed on the substrate 12 and arranged to secure the conductive connecting pin 16 and incorporating a body for securing the conductive connecting pin 16 and an extension portion 24e formed in the periphery of the body. The extension portion 24e of pad 24f is coated with an organic resin insulating layer 20d. The organic resin insulating layer 20d has an opening through which the body of the pad 24f is partially exposed to the outside. The conductive connecting pin 16 is through a conductive adhesive agent 26 secured to the body of the pad exposed to the outside through the opening (see English translation, paragraphs 6, 7, and 15-22; Figs. 1-4).

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With respect to Claim 3, Moriizumi teaches wherein said substrate is build-up substrate having at least one structure in which a conductor layer and an interlayer resin insulating layer are alternately laminated (see paragraphs 17 and 18).

With respect to Claim 13, Moriizumi teaches wherein said conductive connecting pin incorporates a columnar connection portion and a plate-like secured portion, wherein the secured portion is secured to the pad (see Figs. 1 and 2).

With respect to Claims 55 and 56, Moriizumi discloses wherein the conductor layer is covered with an organic resin insulating layer (i.e. any one of layers 20a-20e) having an opening together with the pad is partially exposed to the outside. The conductive connecting pin is through a conductive adhesive agent secured to the pad exposed to the outside through the opening an organic resin insulating layer (see Figs. 1 and 2).

With respect to Claim 66, Moriizumi teaches wherein the diameter of the opening in dielectric layer 20a-20e (i.e. 20a) is 100 micrometers to 900 micrometers (i.e. .1 mm to .9mm), since conductor circuit 24a is .7mm and larger than the opening in dielectric layer 20a (see paragraph 25, Figs. 1 and 2).

With respect to Claim 89, Moriizumi teaches wherein a projection for establishing the connection with the conductor is provided for the reverse side of the projecting pin (see Figs. 1 and 2).

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Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 4, 69, and 84 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Moriizumi et al. (JP 10-294396).

With respect to Claim 4, Moriizumi discloses the claimed invention except for a pad having a diameter that is 1.02 times to 100 times the diameter of the opening.. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter of the pad between 1.02 times to 100 times the diameter of the opening, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Allen*, 105 USPQ 233.

With respect to Claim 69, Moriizumi discloses an opening and a recess around the opening (see Figs. 1 and 2). The phrase "formed by photovia, laser, drill, or punching" makes the claim a product by process claim. Product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product

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was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

With respect to Claim 84, Moriizumi discloses a metal layer (see Figs. 1 and 2). The phrase “formed by any one of a method selected from plating, sputtering, and evaporating” makes the claim a product by process claim. Product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

14. Claims 14-17, 19-22, 32-34, 57, 59-61, 69-72, and 78-82, insofar as definite are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (JP 10-294396) as applied to claims 1, 53, and 62 above, and further in view of Torigian et al. (US 6,623,283) and Degani et al. (US 6,100,475).

With respect to Claim 14-17, 19, 32-34, 57, 59-61, 69-72, 79-80, and 82, Moriizumi discloses a pad 24a for securing the conductive connecting pin 16 having a flat shape to a portion of the conductor layers (i.e. any one of 24b-24f) (see Figs. 1 and 2). Moriizumi fails to disclose a conductive adhesive agent made of Sn/Pb having a melting point of 180° C to 280° C to bond a copper alloy pin to a pad. However, Torigian discloses a conductive adhesive agent (i.e. the coating on the pin) made of Sn/Pb to bond a copper alloy pin 10 to a pad 20 (see col. 3 lines 43-57; Figs. 1 and 2). It is well

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known in the semiconductor industry to have a Sn/Pb alloy has a melting point of 180° C to 280° C as evident by Degani (see col. 4 lines 15-25). Moriizumi and Torigian have substantially the same environment of a pin connected to a substrate by conductive bonding agent. Therefore, one skilled in the art at the time of the invention would readily recognize substituting a Sn/Pb solder for the conductive adhesive agent of Moriizumi, since the Sn/Pb solder would facilitate the connection between the pin and the pad located on a substrate as evident by Torigian.

With respect to Claim 20, Moriizumi discloses wherein the conductor layer is covered with an organic resin insulating layer (i.e. any one of layers 20a-20e) having an opening together with the pad is partially exposed to the outside. The conductive connecting pin is through a conductive adhesive agent secured to the pad exposed to the outside through the opening (see Figs. 1 and 2).

With respect to Claim 21, Moriizumi discloses the claimed invention except for a pad having a diameter that is 1.02 times to 100 times the diameter of the opening.. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter of the pad of Moriizumi to be between 1.02 times to 100 times the diameter of the opening, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Allen*, 105 USPQ 233.

With respect to Claim 22, Moriizumi discloses wherein the substrate is a build-up substrate having at least one structure in which a conductor layer (i.e. any one of layers

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18c-18f) and an interlayer resin insulating layer (i.e. any one of 20b-20e) are alternately laminated (see Figs. 1 and 2).

With respect to Claim 73, Torigian discloses wherein the brazing material is made of nickel (see col. 3 lines 50-57).

With respect to Claim 78, Moriizumi discloses a conductive adhesive layer (see Figs. 1 and 2). The phrase "formed by photovia, laser, drill, or punching" makes the claim a product by process claim. Product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

With respect to Claim 81, Moriizumi discloses the claimed invention except for a the bonding surface of the projecting pin that is .5 times to 1.4 times the area of the opening. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the bonding surface of the pin of Moriizumi to be between .5 times to 1.4 times the diameter of the opening, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Allen*, 105 USPQ 233.

15. Claims 35-40 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (JP 10-294396) in view of Watanabe et al. (JP58-030175).

With respect to Claims 35, 37, and 58, Moriizumi discloses a columnar connection portion 16 and a plate-like 16a secured portion of a pin. A pad 24a for securing the pin to a portion of a conductor layer (i.e. any one of layer 24b-24f). A secured portion of the conductive pin is secured to the pad through a conductive adhesive agent 26 (see English translation, paragraphs 6, 7, and 15-22; Figs. 1-4). Moriizumi fails to disclose wherein the columnar connection portion has constriction portion having a diameter, which is smaller than the diameter of the other portions. However, Watanabe discloses wherein the columnar connection portion 6 has constriction portion 601 having a diameter, which is smaller than the diameter of the other portions (see English abstract and Fig. 2). Thus, Moriizumi and Watanabe have substantially the same environment of a pin attached to a substrate. Therefore, one skilled in the art at the time of the invention would readily recognize incorporating a constriction portion on the pin of Moriizumi, since the constriction portion would connection between the substrate and an external device as taught by Watanabe.

With respect to Claim 36, Moriizumi-Watanabe discloses the claimed invention except for the diameter of the constriction portion is not less than 59% nor more than 98% of the diameter of the other portions. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter of the constriction portion of Moriizumi-Watanabe to be not less than 59% nor more than 98% of the diameter of the other portions since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Allen*, 105 USPQ 233.

With respect to Claim 38, Moriizumi discloses wherein the conductor layer (i.e. any one of layers 24b-24f) is covered with an organic resin insulating layer (i.e. any one of layers 20a-20b) having an opening together with the pad 24a is partially exposed to the outside. The conductive connecting pin is through a conductive adhesive agent 26 secured to the pad 24a exposed to the outside through the opening (see Figs. 1 and 2).

With respect to Claim 39, Moriizumi discloses the claimed invention except for a pad having a diameter that is 1.02 times to 100 times the diameter of the opening.. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the diameter of the pad of Moriizumi to be between 1.02 times to 100 times the diameter of the opening, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Allen*, 105 USPQ 233.

With respect to Claim 40, Moriizumi discloses wherein the substrate is a build-up substrate having at least one structure in which a conductor layer (i.e. any one of layers 24b-24f) and an interlayer resin insulating layer(i.e. any one of layers 20a-20b) are alternately laminated (see Figs. 1 and 2).

16. Claims 50-52, insofar as definite are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (JP 10-294396) and Watanabe et al. (JP58-030175) as applied to claim 37 above, and further in view of Torigian et al. (US 6,623,283) and Degani et al. (US 6,100,475).

With respect to Claims 50-52, Moriizumi-Watanabe discloses a pad 24a for securing the conductive connecting pin 16 having a flat shape to a portion of the conductor layers (i.e. any one of 24b-24f) (see Figs. 1 and 2). Moriizumi-Watanabe both fail to disclose a conductive adhesive agent made of Sn/Pb having a melting point of 180° C to 280° C to bond a copper alloy pin to a pad. However, Torigian discloses a conductive adhesive agent (i.e. the coating on the pin) made of Sn/Pb to bond a copper alloy pin 10 to a pad 20 (see col. 3 lines 43-57; Figs. 1 and 2). It is well known in the semiconductor industry to have a Sn/Pb alloy has a melting point of 180° C to 280° C as evident by Degani (see col. 4 lines 15-25). Moriizumi-Watanabe and Torigian have substantially the same environment of a pin connected to a substrate by conductive bonding agent. Therefore, one skilled in the art at the time of the invention would readily recognize substituting a Sn/Pb solder for the conductive adhesive agent of Moriizumi-Watanabe, since the Sn/Pb solder would facilitate the connection between the pin and the pad located on a substrate as evident by Torigian.

17. Claims 74-77, insofar as definite are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriizumi et al. (JP 10-294396) and Torigian et al. (US 6,623,283) as applied to claims 62 and 70 above, and further in view of and Yamada et al. (US 5,965,064).

With respect to Claims Moriizumi-Torigian discloses the claimed invention except for a conductive adhesive layer made of an epoxy resin with metal particles having a filling factor 30% weight to 90%. However, Yamada discloses a conductive adhesive layer made of an epoxy resin with metal particles having a filling factor 30% weight to

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90% (see col. 13 lines 50-67). Thus, Moriizumi-Torigian and Yamada have substantially the same environment of a conductive material serving as an adhesive for connecting to conductive structures. Therefore, one skilled in the art at the time of the invention would readily recognize substituting a conductive epoxy resin with filler materials for the conductive adhesive of Moriizumi-Torigian, since the epoxy resin would facilitate the electrical connection between to conductor structures as taught by Yamada.

Allowable Subject Matter

18. Claims 5-13, 23-34, and 41-52 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

19. Claims 67 and 68 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowance subject matter: the prior art of record does not teach or suggest the combination of a pad connected to an inner conductor layer through a via hole and the conductive pin is secured to the pad through a conductive adhesive agent along with the other limitations in claims 5-7, 23-25, and 41-43.

The diameter of the recess formed around the opening is 10 micrometers to 75 micrometers, and two or more recess are provided in claim 67.

The prior art made of record and not relied upon is cited primarily to show

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the product of the instant invention.

Conclusion

20. Any inquiry concerning the communication or earlier communications from the examiner should be directed to Alonzo Chambliss whose telephone number is (703) 306-9143. The fax phone number for this Group is (703) 308-7722 or 7724.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-7956

AC/July 24, 2006


Alonzo Chambliss
Primary Patent Examiner
Art Unit 2814